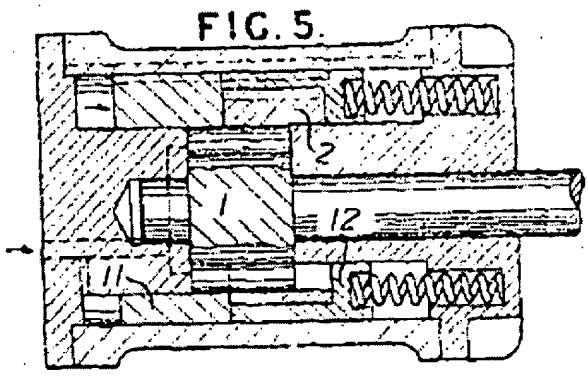
Improvements in and relating to rotary pumps or motors of the n and n + 1 lobe kind

Patent number:	GB859793
Publication date:	1961-01-25
Inventor:	
Applicant:	ZAHNRADFABRIK FRIEDRICHSHAFEN
Classification:	
- international:	
- european:	F04C15/04B
Application number:	GB19570030104 19570925
Priority number(s):	DEX859793 19560925

Report a data error here

Abstract of **GB859793**

859,793. Rotary pumps and motors. ZAHN-RADFABRIK FRIEDRICHSHAFEN A.G. Sept. 25, 1957 [Sept. 25, 1956], No. 30104/57. Class 110 (2). In a rotary pump or motor of the n and n + 1 lobe type the internally-toothed ring 2 is axially displaceable relative to the inner rotor 1 by fluid output pressure acting on a movable bush 11 in opposition to a spring-loaded bush 12.



Data supplied from the ***esp@cenet*** database - Worldwide

PATENT SPECIFICATION

DRAWINGS ATTACHED

859,793

Date of Application and filing Complete Specification: Sept. 25, 1957.

No. 30104/57.

Application made in Germany on Sept. 25, 1956.

Complete Specification Published: Jan. 25, 1961.

Index at acceptance:—Class 110(2), A(1B8:2G1:2G2).

International Classification:—F05g.

COMPLETE SPECIFICATION

Improvements in and relating to Rotary Pumps or Motors of the *n* and *n* + 1 Lobe kind

We, ZAHNRADFABRIK FRIEDRICHSHAFEN AKTIENGESELLSCHAFT, of Friedrichshafen-on-the-Bodensee, Germany, a Joint-Stock Company incorporated under German Law, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to rotary pumps or motors of the *n* and *n*+1 lobe kind, having rotors hereinafter referred to as gearwheels.

It has already been proposed in such arrangements to obtain variation of the working volume by effecting sliding of the inner gearwheel against the outer gearwheel together with an associated part, by hand with the aid of a lever arrangement. The fitting part according to such prior arrangement comprises a disc which is profiled in accordance with the shape of the inner gearwheel and which is provided with a packing of the same kind and which limits the working volume.

In contradistinction to the prior proposed arrangements the present invention provides a rotary pump or motor of the kind as hereinbefore defined, wherein the rotor gearwheels are surrounded and guided by parts of only cylindrical construction, there being provided on one side a cylindrical bearing part with a bush slidable thereon, the outside diameter of the bearing part corresponding to the outside diameter of the inner rotor gearwheel, and on the other side a further cylindrical bearing part with a further bush slidable thereon, the outside diameter of said further bearing part corresponding to the inside diameter or to the addendum circle of the teeth of the outer gearwheel, characterised in that one of the two gearwheels is axially displaceable against spring loading in dependence on the high pressure in the pump or motor, to effect automatic variation in the working volume in dependence of the said fluid pressure. The construction of the enclosed mechanism gives the advantage that the delivery reduces with increasing pressure.

One particular embodiment of the invention is shown by way of example in the accompanying drawings in which:—

Figure 1 is a section in the direction of the longitudinal axis through the mechanisms, the effective fluid pressure space being fully utilised.

Figure 2 is a cross-section on the line II—II of Figure 5.

Figure 3 is a cross-section on the line III—III of Figure 5.

Figure 4 is a cross-section on the line IV—IV of Figure 5.

Figure 5 is a longitudinal section with the effective working volume changed in relation to Figure 1.

Referring to the drawings a gearwheel 1 is provided which for example may be driven as a pump rotor, and an internally toothed ring 2 meshing therewith. The rotor gearwheel 1 is mounted off-centre in relation to the internally toothed ring 2 and in the usual manner has one tooth less than the latter, so that chambers are formed for the delivery of the fluid pressure medium.

The shaft 5 of the rotor gearwheel 1 is mounted off-centre in the end closure covers 3 and 4 of the housing 6. The covers 3 and 4 have extensions 8 and 9 respectively, which project into the housing and against the inner ends of which the rotor gearwheel 1 bears, leaving a very small clearance, so that the rotor is thus held against axial movement. The extension 8 is made concentric to the rotor gearwheel 1 and its outside diameter is equal to the addendum circle of the rotor gearwheel 1, while the extension 9 is made concentric to the internally toothed wheel 2 and has the same outside diameter as the addendum circle of the inwardly directed teeth of the ring 2.

Under these circumstances a running fit exists between the two parts. Two bushes 11 and 12 fitting into the housing 6 are inserted so as to be axially slidable on the extensions 8 and 9. In a recess the bush 12 accommodates the internally toothed wheel 2 with a running fit, so that the latter can run freely, and bears by the end of its projecting annular part against the end of the bush 11, leaving a suitable clearance to permit movement of the internally toothed wheel 2.

The extension 8 has two segmental apertures 13 and 14, which are spaced from another and into which lead the supply and discharge lines 16 and 17 respectively for the fluid pressure medium. From the discharge line 17 passages 18 lead to the cylinder space 20 formed between the inner wall of the housing cover 4 and the opposing end of the bush 11, whereby it is possible to allow the operating pressure to act on the outer end face of the bush 11 in order to impart axial movement to the bush 11 and hence the internally toothed wheel 2 and the bush 12. The bush 12 is spring loaded by the springs 21, each of which is disposed with its outer end in the housing cover 3. Said springs are introduced with predetermined preloading. It is advantageous to guide the bushes 11 and 12 in the housing 6 by means of a key 22 in order to avoid turning in the housing.

The operation of the mechanism when used as a pump is as follows:

When from the state of rest of the mechanism as shown in Figure 1, the shaft 5 with the rotor gearwheel 1 is driven, then through the chambers formed by means of the eccentric mounting of the gear wheels relative to one another and by the difference in their number of teeth, the fluid is delivered for example from a storage tank (not shown) through the suction line 16 and the chamber 13 to the pressure side and from there into the chamber 14 and through the pressure line 17 for delivery. Since the pressure line 17 communicates through the flow-through apertures 18 with the piston space 20, the resulting pressure is also transmitted to the bush 11 and on the pressure rise axial displacement of the bush 11 and of the internally toothed ring 2 with the bush 12 takes place against the action of the springs 21 in the direction of the arrow indicated in Figure 5. As a result of this displacement the width of engagement of the gear wheels is reduced and accordingly the volume of the enclosed spaces surrounded by the cylindrical bushes 11 and 12 and the extensions 8 and 9 respectively is reduced. The springs 21 must be selected appropriately with regard to the desired pump output and also be inserted with suitable initial preloading.

WHAT WE CLAIM IS:—

1. A rotary pump or motor of the kind as hereinbefore defined, wherein the rotor gearwheels are surrounded and guided by parts of only cylindrical construction, there being provided on one side a cylindrical bearing part with a bush slidable thereon, the outside diameter of the bearing part corresponding to the outside diameter of the inner rotor gearwheel, and on the other side a further cylindrical bearing part with a further bush slidable thereon, the outside diameter of said further bearing part corresponding to the inside diameter or to the addendum circle of the teeth of the outer gearwheel, characterised in that one of the two gearwheels is axially displaceable against spring loading in dependence on the high pressure in the pump or motor, to effect automatic variation in the working volume in dependence of the said fluid pressure.

2. A rotary pump or motor according to Claim 1 characterised in that a pressure chamber is formed between one end of the slidable bush and an opposing surface of the pump or motor housing, said pressure chamber communicating with the pressure line of the fluid pressure medium in the pump or motor.

3. A rotary pump or motor as herein described with reference to the accompanying drawings.

H. A. L. VENNER,
Chartered Patent Agent,
1, Great James, Street, Bedford Row,
London, W.C.1.
Agent for the Applicants.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.—1961.
Published by The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

Fig. 4

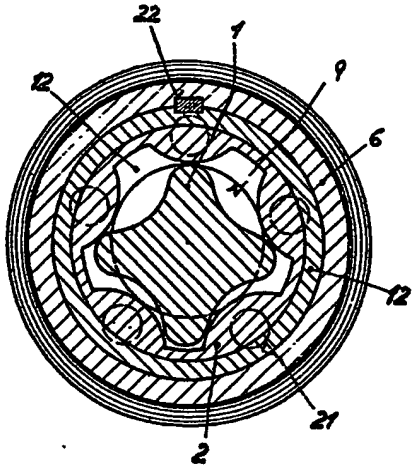
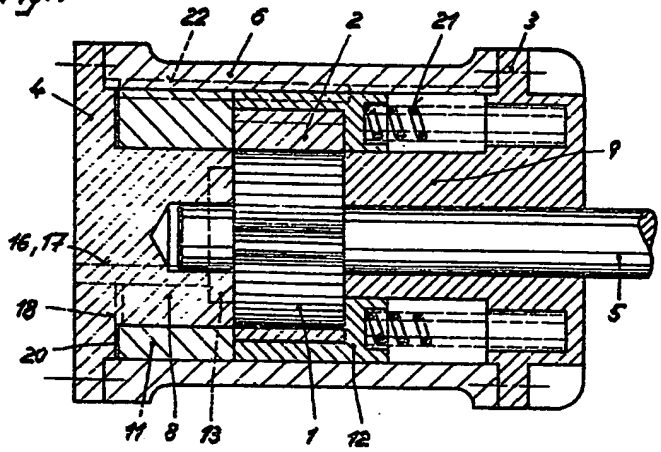


Fig. 1



859,793 COMPLETE SPECIFICATION
2 SHEETS
This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2

Fig. 5

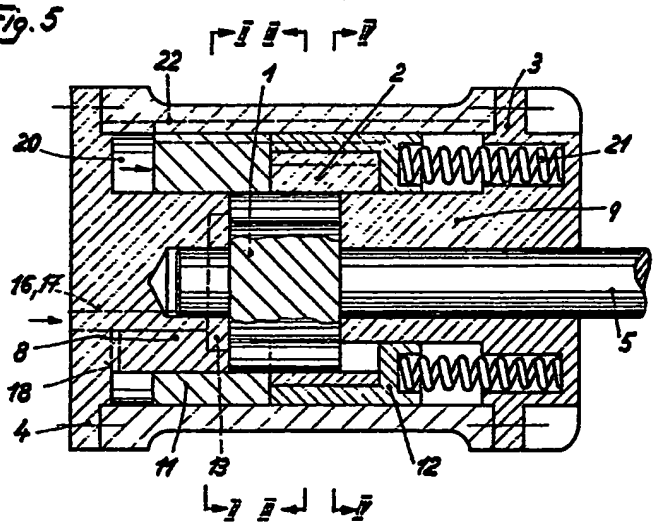


Fig. 2

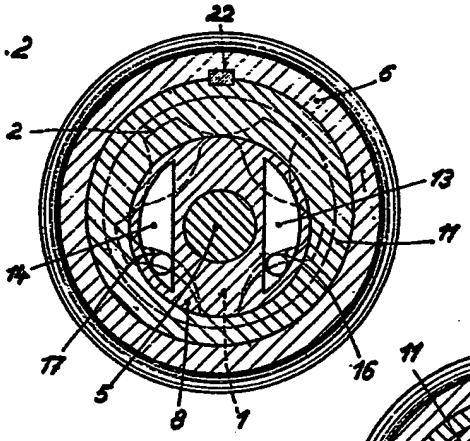
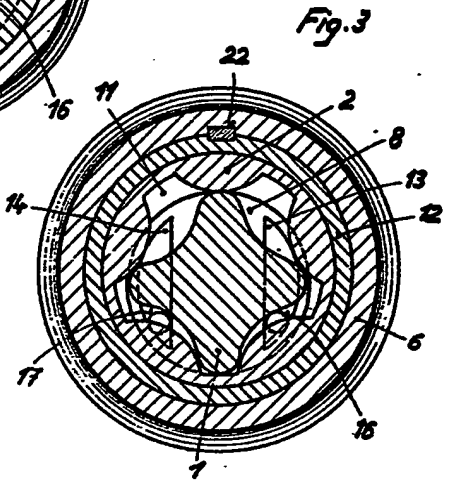


Fig. 3



859,793 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2

Fig. 4

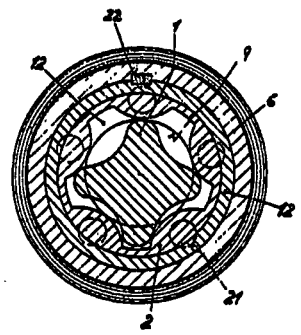


Fig. 1

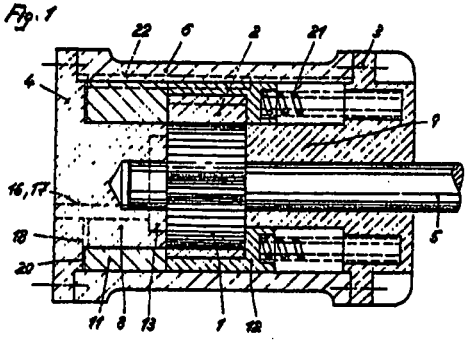


Fig. 5

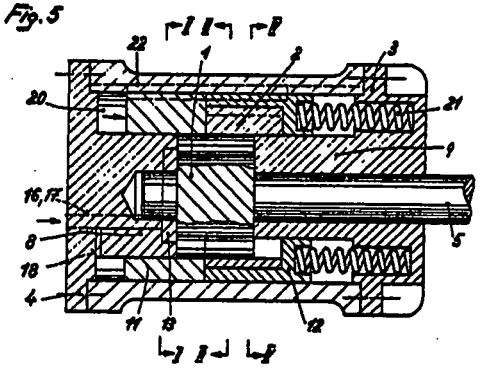


Fig. 2

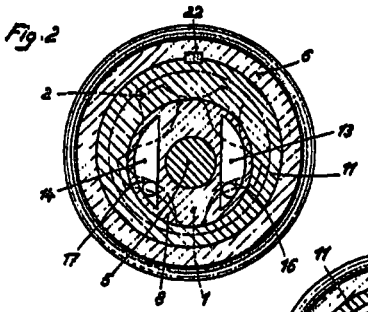


Fig. 3